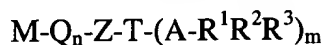
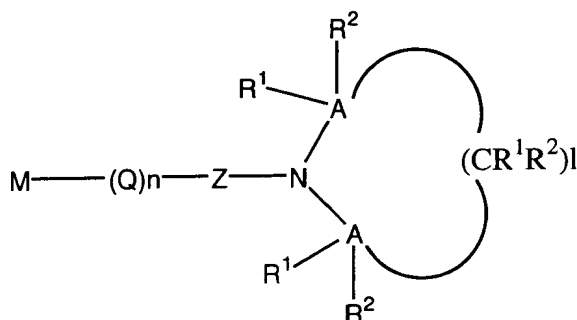


THAT WHICH IS CLAIMED:

A polymerization initiator comprising a compound of the formula



or



5

wherein:

M is an alkali metal selected from the group consisting of lithium, sodium and potassium;

10 Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M-Z linkage;

Z is a branched or straight chain hydrocarbon connecting group which contains 3-25 carbon atoms, optionally containing aryl or substituted aryl groups;

15 T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

20  $(A-R^1R^2R^3)_m$  is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and  $R^1$ ,  $R^2$ , and  $R^3$  are independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

l is an integer from 1 to 7;

n is >0 and <1; and

m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen.

2. The initiator of Claim 1, wherein M is lithium.

3. The initiator of Claim 1, wherein said conjugated diene is selected from the group consisting of 1,3-butadiene, isoprene, 2,3-dimethyl-1,3-butadiene, 1,3-pentadiene (piperylene), myrcene, 2-methyl-3-ethyl-1,3-butadiene, 2-methyl-3-ethyl-1,3-pentadiene, 1,3-hexadiene, 2-methyl-1,3-hexadiene, 1,3-heptadiene, 3-methyl-1,3-heptadiene, 1,3-octadiene, 3-butyl-1,3-octadiene, 3,4-dimethyl-1,3-hexadiene, 3-n-propyl-1,3-pentadiene, 4,5-diethyl-1,3-octadiene, 2,4-diethyl-1,3-butadiene, 2,3-di-n-propyl-1,3-butadiene, 2-methyl-3-isopropyl-1,3-butadiene, and mixtures thereof.

4. The initiator of Claim 1, wherein said alkenylsubstituted aromatic compound is selected from the group consisting of styrene, alpha-methylstyrene, vinyltoluene, 2-vinylpyridine, 4-vinylpyridine, 1-vinylnaphthalene, 2-vinylnaphthalene, 1-alpha-methylvinylnaphthalene, 2-alpha-methylvinylnaphthalene, 1,2-diphenyl-4-methyl-1-hexene, alkyl, cycloalkyl, aryl, alkaryl and aralkyl derivatives thereof and mixtures thereof.

5. The initiator of Claim 4, wherein Q comprises isoprene.

6. The initiator of Claim 1, wherein T is oxygen.

7. The initiator of Claim 1, wherein T is nitrogen.

8. The initiator of Claim 1, wherein T is sulfur.

9. The initiator of Claim 1, wherein A is carbon.

10. The initiator of Claim 1, wherein A is silicon.

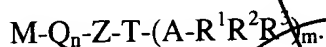
11. The initiator of Claim 1, wherein said initiator is 3-(hexamethyleneimino)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

12. The initiator of Claim 1, wherein said initiator is 3-(pyrrolidino)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

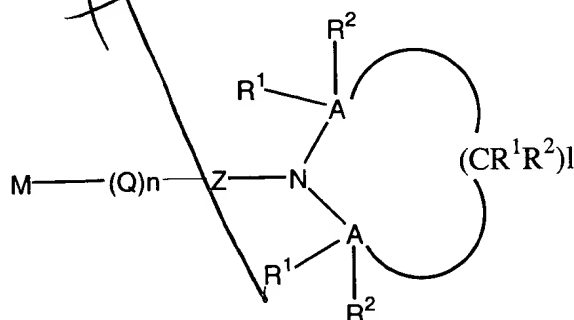
13. The initiator of Claim 1, wherein said initiator is 3-(1,1-dimethylethoxy)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

14. The initiator of Claim 1, wherein said initiator is 2,2-dimethyl-3-trimethylsiloxy-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

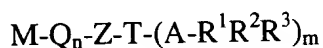
5 15. The initiator of Claim 1, wherein said compound has the formula



16. The initiator of Claim 1, wherein said compound has the formula

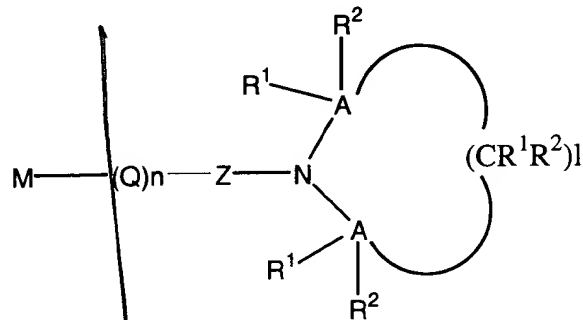


Sub 17. A hydrocarbon composition comprising one or more protected functionalized chain extended anionic polymerization initiators of the formula



or

10



wherein:

M is an alkali metal selected from the group consisting of lithium, sodium and  
5 potassium;

Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M<sub>2</sub>Z linkage;

10 Z is a branched or straight chain hydrocarbon connecting group which contains 3-  
25 carbon atoms, optionally containing aryl or substituted aryl groups;

T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

(A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

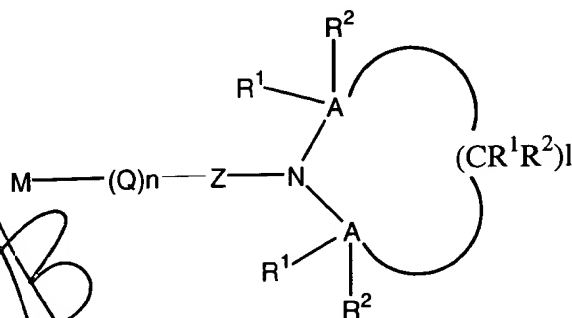
l is an integer from 1 to 7;

$n$  is  $>0$  and  $<1$ ; and

20 m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen.

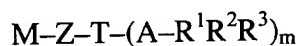
18. The composition of Claim 17, wherein said initiator has the formula  $M-Q_n-Z-T-(A-R^1R^2R^3)_m$ .

19. The composition of Claim 17, wherein said initiator has the formula

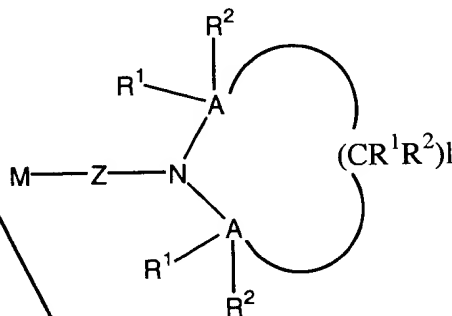


20. The composition of Claim 17, further comprising at least one additional polymerization initiator.

21. The composition of Claim 20, wherein said at least one additional initiator comprises one or more non-chain extended compounds of the formula



or



wherein:

10 M is an alkali metal selected from the group consisting of lithium, sodium and potassium;

Z is a branched or straight chain hydrocarbon connecting group which contains 3-25 carbon atoms, optionally containing aryl or substituted aryl groups;

15 T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

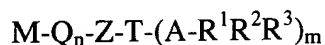
(A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are independently defined

as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

n is an integer from 1 to 7; and

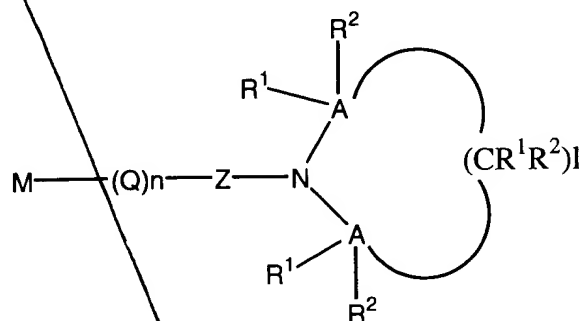
m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen.

- 5        22.        The composition of Claim 20, wherein said at least one additional initiator comprises one or more chain extended compounds of the formula



or

10



wherein:

M is an alkali metal selected from the group consisting of lithium, sodium and potassium;

- 15        Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M-Z linkage;

20        Z is a branched or straight chain hydrocarbon connecting group which contains 3-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

(A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are independently defined

as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

l is an integer from 1 to 7;

n is an integer from 1 to 5; and

5 m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen.

23. The composition of Claim 17, wherein said composition optionally includes a polymerization promoter.

24. The composition of Claim 17, wherein M is lithium.

25. The composition of Claim 17, wherein said conjugated diene is selected  
10 from the group consisting of 1,3-butadiene, isoprene, 2,3-dimethyl-1,3-butadiene, 1,3-pentadiene (piperylene), myrcene, 2-methyl-3-ethyl-1,3-butadiene, 2-methyl-3-ethyl-1,3-pentadiene, 1,3-hexadiene, 2-methyl-1,3-hexadiene, 1,3-heptadiene, 3-methyl-1,3-heptadiene, 1,3-octadiene, 3-butyl-1,3-octadiene, 3,4-dimethyl-1,3-hexadiene, 3-n-propyl-1,3-pentadiene, 4,5-diethyl-1,3-octadiene, 2,4-diethyl-1,3-butadiene, 2,3-di-n-  
15 propyl-1,3-butadiene, 2-methyl-3-isopropyl-1,3-butadiene, and mixtures thereof.

26. The composition of Claim 17, wherein said alkenylsubstituted aromatic compound is selected from the group consisting of styrene, alpha-methylstyrene, vinyltoluene, 2-vinylpyridine, 4-vinylpyridine, 1-vinylnaphthalene, 2-vinylnaphthalene, 1-alpha-methylvinylnaphthalene, 2-alpha-methylvinylnaphthalene, 1,2-diphenyl-4-  
20 methyl-1-hexene, alkyl, cycloalkyl, aryl, alkaryl and aralkyl derivatives thereof and mixtures thereof.

Sus  
04/ 27. The composition of Claim 26, wherein Q comprises isoprene.

28. The composition of Claim 17, wherein T is oxygen.

29. The composition of Claim 17, wherein T is nitrogen.

25 30. The composition of Claim 17, wherein T is sulfur.

31. The composition of Claim 17, wherein A is carbon.

32. The composition of Claim 17, wherein A is silicon.

33. The composition of Claim 17, wherein said initiator is 3-(hexamethyleneimino)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

5 34. The composition of Claim 17, wherein said initiator is 3-(pyrrolidino)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

35. The composition of Claim 17, wherein said initiator is 3-(1,1-dimethylethoxy)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

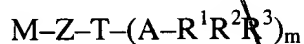
10 36. The composition of Claim 17, wherein said initiator is 2,2-dimethyl-3-trimethylsiloxy-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

37. The composition of Claim 17, wherein said hydrocarbon solvent is selected from the group consisting of alkanes, cycloalkanes, aromatic solvents and mixtures thereof.

38. The composition of Claim 37, wherein said solvent is cyclohexane.

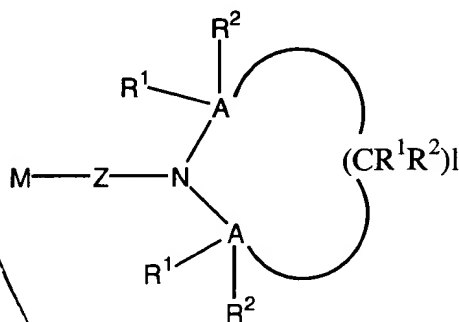
15 39. A method of making chain extended anionic polymerization initiators, comprising:

reacting one or more non-chain extended initiators, singly or in admixture, of the formula



20 or





wherein:

M is an alkali metal selected from the group consisting of lithium, sodium and potassium;

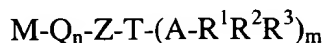
5 Z is a branched or straight chain hydrocarbon connecting group which contains 3-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

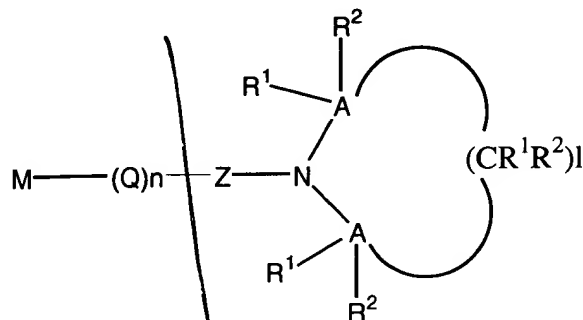
10 (A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

l is an integer from 1 to 7; and

15 m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen, with less than one molar equivalent of one or more chain extension agents selected from the group consisting of conjugated diene hydrocarbons, alkenylsubstituted aromatic compounds and mixtures thereof to produce one or more chain extended initiators of the formula



or



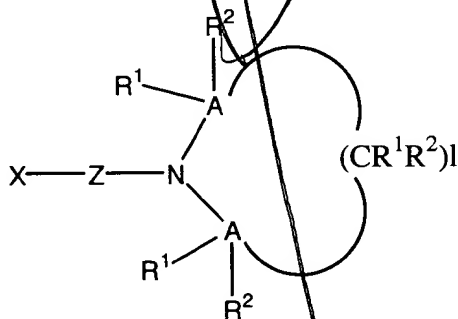
wherein:

$M, Z, T, A, R^1, R^2, R^3, m,$  and  $\lambda$  have the meanings ascribed above;

5 Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M-Z linkage; and

$n$  is  $>0$  and  $<1$ .

10            40.        The method of Claim 39, further comprising prior to said reacting step  
                  reacting an omega-protected-functionalized haloalkyl of the formula  $X-Z-T-(A-R^1R^2R^3)_m$   
                  or



wherein X is halide, with an alkali metal at a temperature between 35 and 130°C in an  
15 inert solvent to form a composition of said non-chain extended initiator in said solvent.

41. The method of Claim 40, wherein:

said non-chain extended initiator is separated from excess alkali metal and co-product alkali metal halide by-product; and

said chain extension agent is added to said non-chain extended initiator composition.

42. The method of Claim 40, wherein said chain extension agent is added to said non-chain extended initiator composition prior to filtration.

5 43. The method of Claim 39, wherein said chain extension step is conducted at a temperature ranging from about  $-30^{\circ}\text{C}$  to about  $150^{\circ}\text{C}$ .

44. The method of Claim 39, wherein said chain extension step is conducted in the presence of one or more Lewis bases.

10 45. The method of Claim 44, wherein said Lewis base is present in an amount from about 0.05 mole to about 5.0 moles per mole of initiator, and wherein said chain extending step is conducted at a temperature from about  $-30^{\circ}\text{C}$  to about  $+30^{\circ}\text{C}$ .

46. The method of Claim 40, wherein substantially all of said non-chain extended initiator is chain extended.

15 47. The method of Claim 40, wherein only a portion of said non-chain extended initiator is chain extended so that said composition comprises a mixture of chain extended and non-chain extended initiators.

48. The method of Claim 40, wherein the alkali metal is lithium.

20 49. The method of Claim 39, wherein said conjugated diene is selected from the group consisting of 1,3-butadiene, isoprene, 2,3-dimethyl-1,3-butadiene, 1,3-pentadiene (piperylene), myrcene, 2-methyl-3-ethyl-1,3-butadiene, 2-methyl-3-ethyl-1,3-pentadiene, 1,3-hexadiene, 2-methyl-1,3-hexadiene, 1,3-heptadiene, 3-methyl-1,3-heptadiene, 1,3-octadiene, 3-butyl-1,3-octadiene, 3,4-dimethyl-1,3-hexadiene, 3-n-propyl-1,3-pentadiene, 4,5-diethyl-1,3-octadiene, 2,4-diethyl-1,3-butadiene, 2,3-di-n-propyl-1,3-butadiene, 2-methyl-3-isopropyl-1,3-butadiene, and mixtures thereof.

25 50. The method of Claim 39, wherein said alkenylsubstituted aromatic compound is selected from the group consisting of styrene, alpha-methylstyrene,

vinyltoluene, 2-vinylpyridine, 4-vinylpyridine, 1-vinylnaphthalene, 2-vinylnaphthalene, 1-alpha-methylvinyl-naphthalene, 2-alpha-methylvinyl-naphthalene, 1,2-diphenyl-4-methyl-1-hexene, alkyl, cycloalkyl, aryl, alkaryl and aralkyl derivatives thereof and mixtures thereof.

5           51.    The method of Claim 50, wherein Q comprises isoprene.

52.    The method of Claim 39, wherein T is oxygen.

53.    The method of Claim 39, wherein T is nitrogen.

54.    The method of Claim 39, wherein T is sulfur.

55.    The method of Claim 39, wherein A is carbon.

10          56.    The method of Claim 39, wherein A is silicon.

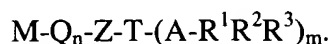
57.    The method of Claim 39, wherein said chain extend initiator is 3-(hexamethyleneimino)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

15          58.    The method of Claim 39, wherein said chain extended initiator is 3-(pyrrolidino)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

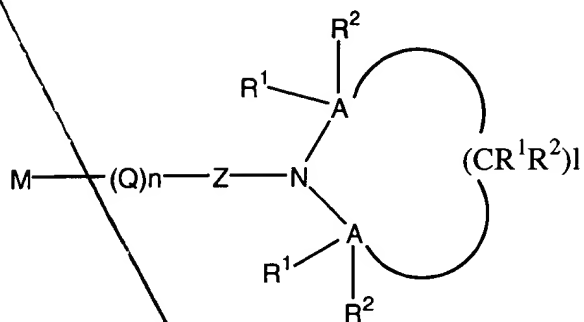
59.    The method of Claim 39, wherein said chain extended initiator is 3-(1,1-dimethylethoxy)-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

20          60.    The method of Claim 39, wherein said chain extended initiator is 2,2-dimethyl-3-trimethylsiloxy-1-propyllithium chain extended with 0.05 to 0.95 equivalents isoprene.

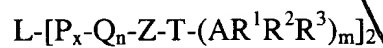
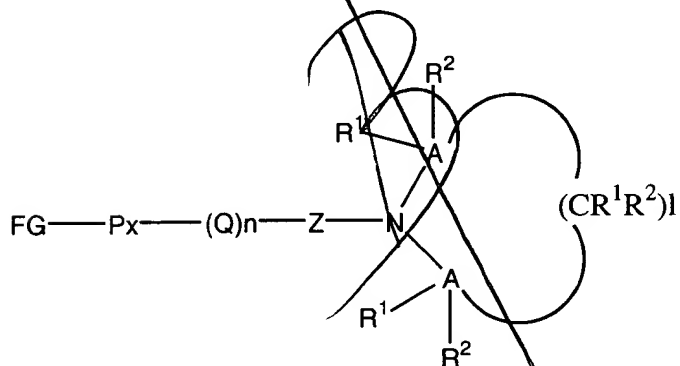
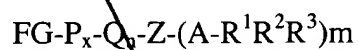
61.    The method of Claim 39, wherein said chain extended initiator has the formula



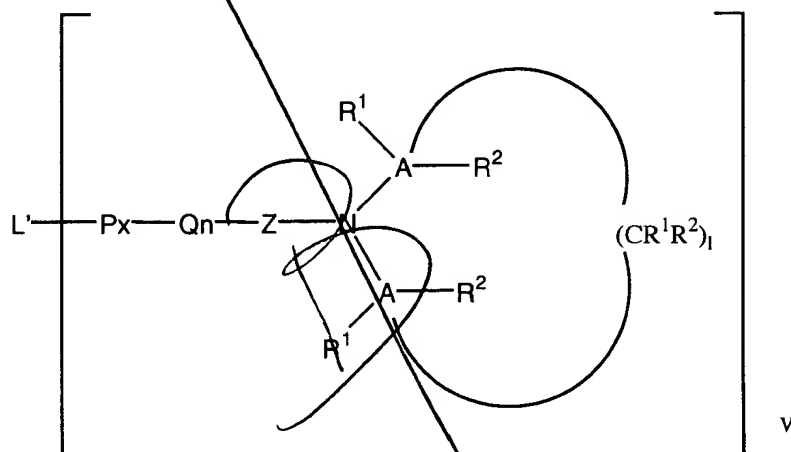
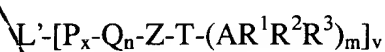
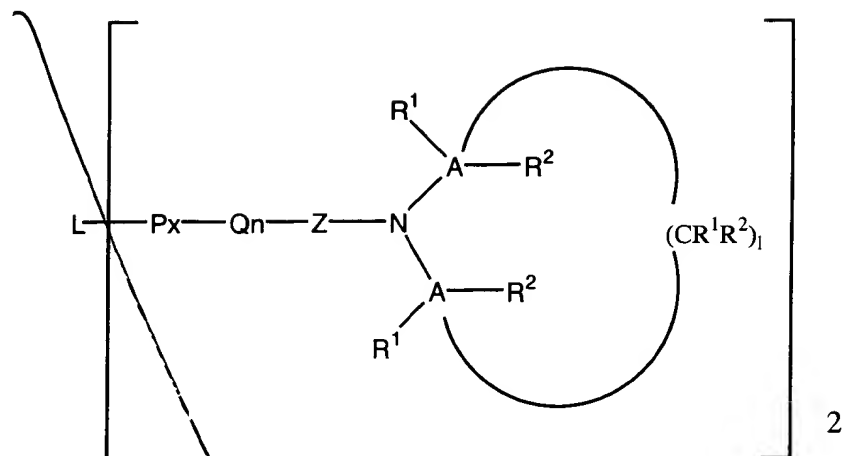
62. The method of Claim 39, wherein said chain extended initiator has the formula



63. A functionalized polymer selected from the group consisting of:



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5

wherein:

FG is H or a protected or non-protected functional group;

P is a saturated hydrocarbyl group derived by incorporation of a compound selected from the group consisting of conjugated diene hydrocarbons, alkenylsubstituted aromatic compounds, and mixtures thereof;

10

x is an integer from 10 to 10,000; and

Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic

compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M-Z linkage;

n is >0 and <1;

Z is a branched or straight chain hydrocarbon connecting group which contains 3-  
5 25 carbon atoms, optionally containing aryl or substituted aryl groups;

T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

(A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are independently defined  
10 as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

l is an integer from 1 to 7;

m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen;

L is a residue of a difunctional linking agent;

15 L' is a residue of a multifunctional linking agent; and

v is from 3 to 30.

64. The polymer of Claim 63, wherein FG is H.

65. The polymer of Claim 63, wherein FG is comprises a functional group  
selected from the group consisting of hydroxyl, thio, amino, carboxyl, amide, silyl,  
20 acrylate, sulfonic acid, isocyanate, and epoxide.

66. The polymer of Claim 63, wherein FG is (A'-R<sup>4</sup>R<sup>5</sup>R<sup>6</sup>)<sub>k</sub>-T'-Y-, wherein:

Y is a branched or straight chain hydrocarbon connecting group which contains 1-  
25 carbon atoms, optionally containing aryl or substituted aryl groups;

T' is oxygen, nitrogen or sulfur;

25 (A'-R<sup>4</sup>R<sup>5</sup>R<sup>6</sup>) is a protecting group in which A' is an element selected from Group IVa of the Periodic Table of the Elements; and R<sup>4</sup>, R<sup>5</sup>, and R<sup>6</sup> are each independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl or R<sup>6</sup> is optionally a -(CR<sup>7</sup>R<sup>8</sup>)<sub>n</sub>- group linking two A' when k is 2, wherein R<sup>7</sup> and R<sup>8</sup> are each independently selected from the group consisting of

hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, and substituted cycloalkyl, and l is an integer from 1 to 7; and

k is 1 when T' is oxygen or sulfur and 2 when T' is nitrogen.

67. The polymer of Claim 63, wherein FG is  $-Y-T'-(H)_k$  wherein:

5 Y is a branched or straight chain hydrocarbon connecting group which contains 1-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T' is oxygen, nitrogen or sulfur; and

k is 1 when T' is oxygen or sulfur and 2 when T' is nitrogen.

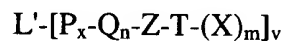
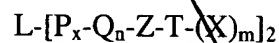
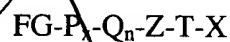
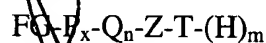
68. The polymer of Claim 63, wherein FG is  $-Y-T'-X$  wherein:

10 Y is a branched or straight chain hydrocarbon connecting group which contains 1-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T' is oxygen, nitrogen or sulfur; and

X is a polymer segment derived by incorporation of at least one comonomer reacted with T'.

15 69. A polymer selected from the group consisting of:



wherein:

FG is H or a protected or non-protected functional group;



P is a saturated hydrocarbyl group derived by incorporation of a compound selected from the group consisting of conjugated diene hydrocarbons, alkenylsubstituted aromatic compounds, and mixtures thereof;

x is an integer from 10 to 10,000; and

- 5 Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M-Z linkage;

n is  $>0$  and  $<1$ ;

- 10 Z is a branched or straight chain hydrocarbon connecting group which contains 3-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

- (A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> is a protecting group in which A is an element selected from Group  
15 IVa of the Periodic Table of the Elements, and R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> are independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl groups;

l is an integer from 1 to 7;

m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen;

- 20 L is a residue of a difunctional linking agent;

L' is a residue of a multifunctional linking agent;

v is from 3 to 30; and

X is a polymer segment derived by reaction of T with one or more comonomers.

70. The polymer of Claim 69, wherein FG is H.

- 25 71. The polymer of Claim 69, wherein FG is a functional group selected from the group consisting of hydroxyl, thio, amino, carboxyl, amide, silyl, acrylate, sulfonic acid, isocyanate, and epoxide.

72. The polymer of Claim 69, wherein FG is (A'-R<sup>4</sup>R<sup>5</sup>R<sup>6</sup>)<sub>k</sub>-T'-Y-, wherein:

Y is a branched or straight chain hydrocarbon connecting group which contains 1-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T' is oxygen, nitrogen or sulfur;

(A'-R<sup>4</sup>R<sup>5</sup>R<sup>6</sup>) is a protecting group in which A' is an element selected from Group IVa of the Periodic Table of the Elements; and R<sup>4</sup>, R<sup>5</sup>, and R<sup>6</sup> are each independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl or R<sup>6</sup> is optionally a -(CR<sup>7</sup>R<sup>8</sup>)<sub>l</sub>- group linking two A' when k is 2, wherein R<sup>7</sup> and R<sup>8</sup> are each independently selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, and substituted cycloalkyl, and l is an integer from 1 to 7; and k is 1 when T' is oxygen or sulfur and 2 when T' is nitrogen.

73. The polymer of Claim 69, wherein FG is (H)<sub>k</sub>-T'-Y-.

74. The polymer of Claim 63, wherein FG is -Y-T'-X wherein:

Y is a branched or straight chain hydrocarbon connecting group which contains 1-25 carbon atoms, optionally containing aryl or substituted aryl groups;

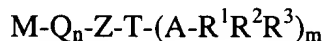
T' is oxygen, nitrogen or sulfur, and

X is a polymer segment derived by incorporation of at least one comonomer reacted with T'.

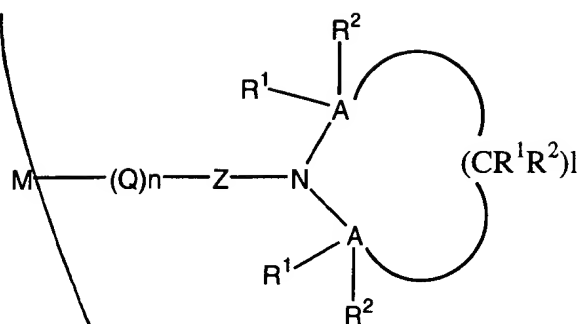
75. A method for the anionic polymerization of anionically polymerizable monomers comprising the steps of:

initiating polymerization of a conjugated diene hydrocarbon monomer, a mixture of conjugated diene monomers, an alkenylsubstituted aromatic compound, a mixture of alkenylsubstituted aromatic compounds, or a mixture of one or more conjugated diene hydrocarbons and one or more alkenylsubstituted aromatic compounds in a hydrocarbon or mixed hydrocarbon-polar solvent medium at a temperature of 10°C to 150°C with one or more initiators having the formula:

formula



or



wherein:

M is an alkali metal selected from the group consisting of lithium, sodium and potassium;

5        Z is a branched or straight chain hydrocarbon connecting group which contains 3-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T is selected from the group consisting of oxygen, sulfur, and nitrogen groups and mixtures thereof;

10         $(\text{A}-\text{R}^1\text{R}^2\text{R}^3)_m$  is a protecting group in which A is an element selected from Group IVa of the Periodic Table of the Elements, and  $\text{R}^1$ ,  $\text{R}^2$ , and  $\text{R}^3$  are independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl;

l is an integer from 1 to 7; and

m is 1 when T is oxygen or sulfur, and 2 when T is nitrogen,

15        Q is a saturated or unsaturated hydrocarbyl group derived by incorporation of one or more conjugated diene hydrocarbons, one or more alkenylsubstituted aromatic compounds, or mixtures of one or more dienes with one or more alkenylsubstituted aromatic compounds into the M-Z linkage; and

n is  $>0$  and  $<1$ ,

20        to form an intermediate living polymer anion;

reacting the intermediate living polymer with a terminating, functionalizing, or coupling agent;

optionally removing at least one protecting group to liberate at least one functional group; and

optionally reacting said at least one liberated functional group with one or more comonomers to form a polymer segment.

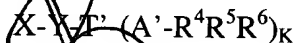
76. The method of Claim 75, wherein said polymer is hydrogenated either before or after said optional deprotection step.

5 77. The method of Claim 75, wherein said terminating step comprises an acid quenching step.

78. The method of Claim 75, wherein said terminating step comprises reacting said living polymer with a functionalizing agent.

10 79. The method of Claim 78, wherein said functionalizing agent is selected from the group consisting of alkylene oxides; oxygen; sulfur; carbon dioxide; halogens; propargyl halides; alkenylhalosilanes; omega-alkenylarylhalosilanes; sulfonated compounds; amides; silicon acetals; 1,5-diazabicyclo[3.1.0]hexane; allyl halides; acryloyl and methacryloyl chloride; amines; epihalohydrins; and haloalkyl trialkoxysilanes.

15 80. The method of Claim 78, wherein said functionalizing agent is an electrophile of the structure:



wherein:

X is halogen selected from chloride, bromide and iodide;

20 Y is a branched or straight chain hydrocarbon connecting group which contains 1-25 carbon atoms, optionally containing aryl or substituted aryl groups;

T' is oxygen, nitrogen or sulfur;

(A'-R<sup>4</sup>R<sup>5</sup>R<sup>6</sup>) is a protecting group in which A' is an element selected from Group IVa of the Periodic Table of the Elements; and R<sup>4</sup>, R<sup>5</sup>, and R<sup>6</sup> are each independently defined as hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl and substituted cycloalkyl or R<sup>6</sup> is optionally a -(CR<sup>7</sup>R<sup>8</sup>)<sub>l</sub>- group linking two A' when k is 2, wherein R<sup>7</sup> and R<sup>8</sup> are each independently selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, and substituted cycloalkyl, and l is an integer from 1 to 7; and

k is 1 when T' is oxygen or sulfur and 2 when T' is nitrogen.

81. The method of Claim 80, further comprising removing the protecting group (A'-R<sup>4</sup>R<sup>5</sup>R<sup>6</sup>) to liberate T'.

82. The method of Claim 81, further comprising reacting said liberated T' with one or more comonomers to form a polymer segment.

83. The method of Claim 82, wherein said comonomers are selected from the group consisting of cyclic ethers, diamines, diisocyanates, polyisocyanates, di-, poly- and cyclic amides, di- and polycarboxylic acids, diols, polyols, anhydrides, and mixtures thereof.

84. The method of Claim 81, further comprising reacting said liberated T' with an agent containing a reactive olefinic bond to form a olefinic terminal group.

85. The method of Claim 84, wherein said agent is acryoyl or methacryoyl chloride.

86. The method of Claim 80, comprising removing the protecting group (A-R<sup>1</sup>R<sup>2</sup>R<sup>3</sup>)<sub>m</sub> to liberate the protecting group T.

87. The method of Claim 86, further comprising reacting said liberated T with one or more comonomers to form a polymer segment.

88. The method of Claim 87, wherein said comonomers are selected from the group consisting of cyclic ethers, diamines, diisocyanates, polyisocyanates, di-, poly- and cyclic amides, di- and polycarboxylic acids, diols, polyols, anhydrides, and mixtures thereof.

89. The method of Claim 86, further comprising reacting said liberated T with an agent containing a reactive olefinic bond to form a olefinic terminal group.

90. The method of Claim 89, wherein said agent is acryoyl or methacryoyl chloride.

Add A1